Title of the Invention

MONITOR DEVICE FOR DISPLAYING OUTPUT DISPLAY IMAGES OF A PLURALITY OF COMPUTERS

BACKGROUND OF THE INVENTION

The present invention relates to a monitor device for use in computers.

Usually, a desktop or any other stationary type computer is equipped with an easy-to-look-at large monitor device and easy-to-handle input devices such as a keyboard and a mouse. On the other hand, a laptop or palmtop type portable computer is provided, with a view to reducing the size and weight, with input devices such as a small keyboard and a pointing device, whose handling ease is sacrificed for size and weight reduction, and with a less easy-to-look-at small monitor, all integrated into the computer.

A monitor device provided on a stationary computer can receive no more than one image input at a time. As a result, if a monitor device used for displaying output display images of a computer is to be used for displaying the output display images of another computer, the connection between the monitor device and the computer should be rewired. Or else, the connection between the monitor device and the computer should be switched over with a separately provided

selector or the like. This is also true of input devices. If an input device used for inputting to a computer is to be used for inputting to another computer, the connection between the input device and the computer should be rewired. Or else, the connection between the input device and the computer should be switched over with a separately provided selector or the like.

Sometimes one user may want to use a plurality of computers at the same time. In such a case, however, as input devices and monitor devices are separately provided for different computers, the user should use a different input device or look at a different monitor device for each computer. Especially where one computer is a laptop computer and another is a stationary computer, in spite of the presence in the same location of a better visible monitor device and a better operable input device provided for the stationary computer, the monitor and input device inferior in visibility and operability provided for the laptop computer should be used when that laptop unit is to be operated.

In such a case, it is possible to use a monitor device and input device provided for one computer as ones for another computer by either rewiring the connections of the monitor device and input device to the computer or providing and operating separate selector switches.

However, even in such an arrangement, the image displayed on the monitor device at a time is the output display image of only one computer, and accordingly the user cannot check output display images of a plurality of computers at the same time. Moreover, where the computer to be operated is changed frequently, the user has to leave the input device he or she is operating and rewire the input and monitor devices or to manipulate the separately provided switches every time the computer is changed.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a monitor device capable of displaying output display images of a plurality of computers at the same time.

Another object of the invention is to enable the user to use, without having to leave a specific input device, that specific input device and a specific monitor device as the monitor device and input device of a plurality of computers.

In order to achieve the above-stated objects, a monitor device according to the invention comprises a plurality of display data interfacing units for entering display data from individual computers; a plurality of communication data interfacing units for inputting/outputting communication data between the individual computers; a superposed display unit for

superposed displaying of two or more images represented by display data entered into two or more of the display data interfacing units; and a display controller for altering the form of the superposed displaying on the basis of communication data for instructing alteration in the form of superposed displaying, which are entered into the communication data interfacing units.

Such a monitor device can display output display images from a plurality of computer at the same time. Moreover, the capability to alter the form of superposed displaying on the monitor device from the computers enables the monitor device to adapt the display to the contents desired to be checked, and accordingly the monitor device can be used in practice as the monitor device for a plurality of computers.

If this monitor device is equipped with one or more input data interfacing units for entering input data from an input device, and an input data repeater for supplying from one communication data interfacing unit to be dynamically selected out of the plurality of communication data interfacing units input data to be entered into a computer having entered inputs into the input data interfacing unit(s) to the computer carrying out inputting/outputting from/to this communication data

interfacing unit, a specific input device can be used as the input device for a plurality of computers.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates a mode of use of a monitor device.

Fig. 2 illustrates the connective relationships between the monitor device and other units.

Fig. 3 illustrates an example of display on the monitor device.

Fig. 4 is a block diagram of the monitor device.

Fig. 5 is a block diagram of the communication controller of the monitor device.

Fig. 6 is a block diagram of the display controller of the monitor device.

Fig. 7 is a block diagram illustrating the configuration of the resolution/frequency converter of the monitor device.

Fig. 8 is a block diagram of the liquid data converter of the monitor device.

Fig. 9 illustrates another mode of use of the monitor device.

Fig. 10 illustrates the connective relationships between the monitor device and other units.

Fig. 11 is a block diagram of the monitor device.

Fig. 12 is a block diagram of the communication controller of the monitor device.

Fig. 13 illustrates still another mode of use of the monitor device.

Fig. 14 illustrates the connective relationships between the monitor device and other units.

Fig. 15 illustrates an example of display on the monitor device.

Fig. 16 is a block diagram of the monitor device.

Fig. 17 is a block diagram of the communication controller of the monitor device.

Fig. 18 is a block diagram of the display controller of the monitor device.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of the present embodiment will be described below.

Fig. 1 illustrates a mode of use of a monitor device.

In the figure, 1 denotes a monitor device; 2, a first computer (hereinafter "first PC"); and 3, a second computer (hereinafter "second PC"). The first PC 2 is a stationary computer equipped with a keyboard 4 and a mouse 5 as input devices. The second PC 3 is a laptop type computer with its input devices, such as a keyboard and a pointing device, integrated into it.

Next, Fig. 2 illustrates the connective relationships of the monitor device 1 to the first PC 2 and the second PC 3.

In Fig. 2, 13 denotes a first PC connector fitted to the first PC 2 for monitor connection; 19, a first monitor connector fitted to the monitor device 1 for first PC connection. Between the first PC connector 13 and the first monitor connector 19 are wired a first display data transmission line 14 for transmitting to the monitor device 1 first display data, which are display data supplied by the first PC 2, and a first communication data transmission line 15 for transmitting and receiving communication data between the first PC 2 and the monitor device 1.

Further, 16 denotes a second PC connector fitted to the second PC 3 for monitor connection, and 20, a second monitor connector fitted to the monitor device 1 for second PC connection. Between the second PC connector 16 and the second monitor connector 20 are wired a second display data transmission line 17 for transmitting to the monitor device 1 second display data, which are display data supplied by the second PC 3, and a second communication data transmission line 18 for transmitting and receiving communication data between the second PC 3 and the monitor device 1.

The following description will refer to a case in which both the first display data and the second display data, respectively sent from the first PC 2 and the second PC 3 to the monitor device 1, are display data for color displaying, which are R, G and B color data each of eight bits, transmitted in a low voltage differential signal (LVDS) system. In the case described below, both the first communication data transmission line 15 and the second communication data transmission line 18 are transmission lines for serial communication, known as universal serial buses (USB), though they may as well be transmission lines for faster serial communication satisfying the IEEE 1394 standard, other ones for serial communication, or ones for parallel communication.

As illustrated in Fig. 3, it is made possible to display a display image 7 corresponding to second display data from the second PC 3 within a display image 6 corresponding to first display data from the first PC 2 to the monitor device 1. It is further made possible to alter the position and/or size of the display image 7 on the second PC 3 or the contrast, brightness and/or position adjustment of display on the monitor device 1 from either the first PC 2 or the second PC 3. Communication between the first PC 2 and the second PC 3 via the monitor device 1 is also made possible.

The monitor device 1 which makes possible these actions is illustrated in Fig. 4. In Fig. 4, 21 denotes a communication controller; 22, a second resolution signal; 23, a display position designation signal; 24, a display controller; 25, liquid display data; 26, a liquid display panel.

Each unit will be described in detail below.

First will be described the actions of the communication controller 21.

Fig. 5 illustrates the configuration of the communication controller 21.

The communication controller 21 comprises a communication data identifying unit 52, a window information generating unit 53 and a liquid data conversion control signal generating unit 127.

Now, communication data sent from the first PC 2 via the first communication data transmission line 15 and the communication data sent from the second PC 3 via the second communication data transmission line 18 are sent to a communication data identifying unit 52. The communication data transmitted via the first communication data transmission line 15 and the second communication data transmission line 18 are augmented with the destination of the communication data when they are transmitted. To communication data whose destination is the monitor device

1 is added an identifier representing the contents of the communication data.

The contents of communication data to be transmitted by the first PC 2 or the second PC 3 to the monitor device 1 include information indicating the display position and/or the display size of the display image 7 on the second PC 3, and information indicating the contrast, brightness and/or position adjustment quantity of the display on the monitor device 1. These communication data, in a state wherein a predetermined unique identifier is added to it, are entered into the communication data identifying unit 52.

The communication data identifying unit 52, if the destination of entry from the first PC 2 via the first communication data transmission line 15 is the communication data of the second PC 3, transmits the data as they are to the second PC 3 via the second communication data transmission line 18. Or if the destination of entry from the second PC 3 via the second communication data transmission line 18 is the communication data of the first PC 2, the unit transmits the data as they are to the first PC 2 via the first communication data transmission line 15.

This makes possible communication between the first PC 2 and the second PC 3 via the monitor device 1.

On the other hand, if the destination of entry from the first PC 2 via the first communication data transmission

line 15 is the communication data of the monitor device 1, or if the destination of entry from the second PC 3 via the second communication data transmission line 18 is the communication data of the monitor device 1, the identifier representing the contents is discerned, and information indicating the display position and/or the display size of the display image 7 on the second PC 3 is transferred to the window information generating unit 53, or information indicating the contrast, brightness and/or position adjustment quantity of the display on the monitor device 1 is transferred to the liquid data conversion control signal generating unit 127.

The window information generating unit 53, according to the received information indicating the display position and/or the display size, supplies the display controller 24 with a second resolution signal 22 representing the magnitude (resolution) of the display image of the second PC 3 and a display position signal 23 indicating the display position and the presence or absence of display. Incidentally, information indicating the display position and/or the display size of the display image 7 on the second PC 3, sent from either the first PC 2 or the second PC 3, consists of the presence or absence of display, information on the top left coordinates of the display image of the second PC 3, and information on the number of lines in the

vertical direction and the number of dots in the horizontal direction.

The window information generating unit 53 supplies as the display position signal 23 a single bit signal which is "0" when the scanning position of the monitor device 1 is in a position in which the display image 7 of the second PC 3 is not displayed, or "1" when it is in a position in which the display image 7 of the second PC 3 is displayed. Further the window information generating unit 53 supplies as the resolution signal 22 a signal representing the number of dots in the horizontal direction in 10 bits and the number of dots in the vertical direction in 10 bits. Thus, as shown in Fig. 3, if a frame on the monitor device 1 consists of 1024 × 768 dots and the display image 7 on the second PC 3 of 640 × 480 dots in size is to be displayed from the 10th dot in the horizontal direction and the 10th line in the vertical direction, the display position signal 23 will be "1" from the 10th to 489th lines in the vertical direction while the monitor device 1 is scanning the 10th to 649th dots in the horizontal direction, and the resolution signal 22 will be a signal indicating 640dots in the horizontal direction and 480 dots in the vertical direction.

On the other hand, the liquid data conversion control signal generating unit 127, according to the received information indicating the contrast, brightness and/or

position adjustment quantity of display, supplies the display controller 24 with a display position control signal 96 representing the position adjustment quantity of the display of the monitor device 1, a display contrast control signal 97 designating the contrast of the display of the monitor device 1, and a display brightness control signal 98 designating the brightness of the display of the monitor device 1.

Next will be described the display controller 24.

Fig. 6 illustrates the configuration of the display controller 24.

In the figure, 27 denotes a first data converter; 28, a second data converter; 29, first parallel data; 30, a first sync signal; 31, second parallel data; 32, a resolution/frequency converter; 33, window display parallel data; 34, a data selector; 35, superposed display data; and 36, a liquid data converter.

The first data converter 27 converts first display data, which are LVDS signals entered via the first display data transmission line 14, into display data of R (red), G (green) and B (blue), a vertical sync signal, a horizontal sync signal, a display effective period signal, and a dot clock, and supplies them to the data selector 34 as the first parallel data 29. It also supplies the resolution/frequency

converter 32 with the vertical sync signal, the horizontal sync signal and the dot clock as first sync signals 30.

The second data converter 28, like the first data converter 27, converts second display data, which are LVDS signals entered via the second display data transmission line 17, into display data of R (red), G (green) and B (blue), a vertical sync signal, a horizontal sync signal, a display effective period signal, and a dot clock, and supplies them to the data selector 34 as the second parallel data 31.

Here, display data contained in the first parallel data 29 and the second parallel data 31 are supposed to be display data of eight bits each of RGB (16.7 million color display).

The resolution/frequency converter 32 subjects the second parallel data 31 to resolution conversion in accordance with the resolution signal 22 and to frequency conversion so as to equalize their frequency to that of the first parallel data 29 in accordance with the first sync signal 30. Then it supplies the converted data as window display parallel data 33.

The resolution/frequency converter 32 is configured as illustrated in Fig. 7.

In the figure, 37 denotes a resolution converter; 38, a resolution-converted sync signal; 39, resolution-converted display data; 40, a write operation controller;

41, a write operation control signal; 42, a read operation controller; 43, a read operation control signal; and 44, a window image storing unit.

The resolution converter 37 subjects the second parallel data 31 to resolution conversion in accordance with the resolution indicated by the resolution signal 22, and supplies the converted data as resolution-converted display data 39 together with the resolution-converted vertical sync signal, the horizontal sync signal, and the resolution-converted sync signal 38, which is a dot clock. The write operation controller 40, on the basis of the resolution-converted sync signal 38, generates the write operation control signal 41, which is a timing signal for temporarily storing the resolution-converted display data 39 into the window image storing unit 44.

The read operation controller 42, in order to display the display image 7 on the second PC 3 within the display image 6 on the first PC 2, generates the read operation control signal 43 for reading the resolution-converted display data 39 from the window image storing unit 44 as the window display parallel data 33 to match the display position of the display image 7 on the second PC 3 according to the first sync signal 30, which is a sync signal out of the first parallel data 29, and the display position signal 23. The window image storing unit 44, in accordance with

the write operation control signal 41, stores a single frame equivalent of the resolution-converted display data 39, and supplies it as the window display parallel data 33 in accordance with the read operation control signal 43.

Referring back to Fig. 6, the data selector 34, in accordance with the display position signal 23, switches the first parallel data 29 and the window display parallel data 33 so as to supply the window display parallel data 33 at the display timing of the display image 7 on the second PC 3, and supplies them as the superposed display data 35. Here it supplies the first parallel data 29 when the display position signal 23 is "0" or the window display parallel data 33 when the signal is "1".

The liquid data converter 36 converts the superposed display data 35 consisting of parallel data of RGB of eight bits each into input signals for the liquid crystal display 26, and supplies them as the liquid crystal display data 25.

Fig. 8 illustrates the configuration of this liquid data converter.

In the figure, 114 denotes a liquid data generator; 115, unadjusted liquid crystal display data; 116, a tone characteristic converter; and 117, a back light controller.

The liquid data generator 114 converts the superposed display data 35, consisting of the parallel data of RGB of eight bits each and the sync signal, at the display timing

of the liquid crystal display 26. It supplies them as the unadjusted liquid crystal display data 115 and the liquid crystal display sync signal 101, and at the same time controls the liquid crystal display sync signal 101 so as to coordinate it with the display position of the whole frame in accordance with the display position control signal 96. The tone characteristic converter 116, in order to adjust the display contrast, converts the tone characteristic of the unadjusted liquid crystal display data 115 in accordance with the display contrast control signal 97, and supplies the converted data as the liquid crystal display data 25. If it is desired, for instance, to increase the contrast, the data of RGB of eight bits each are converted so as to maximize the difference between the highest brightness and the lowest brightness or if, conversely, it is desired to decrease the contrast, the data of RGB of eight bits each are converted so as to reduce the data of the highest brightness or to enhance the data of the lowest brightness. The back light controller 117, in accordance with the display brightness control signal 98, generates a liquid crystal panel back light control signal 102 for controlling the a back light of a liquid crystal display 103.

As described above, it is possible to display the display image 7 on the second PC 3 in the display image 6 on the first PC 2 of the monitor device 1. It is also possible

to alter from either the first PC 2 or the second PC 3 the position and/or size of the display image 7 on the second PC 3 or the contrast, brightness and/or position adjustment of the display on the monitor device 1.

Now, altering the position and/or size of the display image 7 on the second PC 3 or the contrast, brightness and/or position adjustment of display on the monitor device 1 from either the first PC 2 or the second PC 3 is accomplished in the following manner. It can be accomplished by, for instance, causing driver software controlling the monitor device 1 operating on either the first PC 2 or the second PC 3 to send instructions from the user to the monitor device 1 as described above.

Or else, altering the position and/or size of the display image 7 on the second PC 3 is accomplished, for instance, by managing the position and/or size of the display image 7 on the second PC 3, accepting the desired changes according to the manipulation of the mouse 3 by the user, and sending the pertinent instructions to the monitor device 1 as described above. Alternatively, it can as well be accomplished by causing software working in coordination with the OS of the first PC 2 to operate on the first PC 2. In this case, this software accepts any change in the position and/or size of the display image 7 on the second PC 3 according to the dragging of the mouse 3.

Thus, if the title bar position of the display image 7 on the second PC 3 is dragged, a position change will be accepted, or if the bottom right corner of the display image 7 on the second PC 3 is dragged, a size change will be accepted.

The monitor device 1 so far described enables the user to accomplish file transfers among other things from the first PC 2 to the second PC 3 or vice versa by using communication software working on the first PC 2 or the second PC 3 while watching the display on the monitor device 1. The user is also enabled to exchange directory information or display information between the first PC 2 and the second PC 3 and cause the two PCs to operate in coordination. For instance, the user may manipulate the mouse 3 to accomplish file drag-and-drop displaying between the display image 7 on the second PC 3 and the display image 6 on the first PC 2, together with a file transfer between the first PC 2 and the second PC 3 interlocked with the file drag-and-drop displaying.

Incidentally, while the display data sent from the first PC 2 and the second PC 3 are supposed to be LVDS signals in this embodiment, some other form of display data may be used if the monitor device 1 is provided with an appropriate interface.

Next, another mode of the use of the monitor device is illustrated in Fig. 9.

As shown in Fig. 9, a keyboard 141 and a mouse 142 are connected to a monitor device 138.

Next are illustrated in Fig. 10 connective relationships of the monitor device 138 to the first PC 2, the second PC 3, the keyboard 141 and the mouse 142.

As illustrated, the connections of the monitor device 138 to the first PC 2 and the second PC 3 are similar to the corresponding connections shown in Fig. 1. Note should be taken of the fact that, in Fig. 10, the monitor device 138 is connected to the keyboard 141 and to the mouse 142 respectively by a keyboard input signal transmission line 151 and a mouse input signal transmission line 152, each fitted to the monitor device 138 via a connector. Both the keyboard input signal transmission line 151 and the mouse input signal transmission line 152, like the first communication data transmission line 15 and the second communication transmission line 18, consist of a USB.

Now in the configuration of Fig. 9, in addition to the actions described with reference to Fig. 1, the keyboard 141 and the mouse 142 connected to the monitor device 138 can be used as input devices for the first PC 2 and the second PC 3. Furthermore, the contrast, brightness and/or position

adjustment of displaying on the monitor device 138 can be altered from the keyboard 141.

Fig. 11 shows the configuration of the monitor device 138 making possible such operations.

As illustrated, the configuration of the monitor device 138 differs from the monitor device 1 in Fig. 1 in that the keyboard input signal transmission line 151 and the mouse input signal transmission line 152 are connected to the communication controller 153. The monitor device 138 also differs from the monitor device 1 in Fig. 4 in the configuration and actions of the communication controller 153.

Therefore, details of this communication controller 153 will be described below.

Fig. 12 illustrates the configuration of the communication controller 153.

As illustrated, the communication controller 153, like the communication controller 21 in Fig. 4, comprises a communication data identifying unit 169, a window information generating unit 53 and a liquid data conversion control signal generating unit 127.

Here, communication data sent from the first PC 2 via the first communication data transmission line 15, communication data sent from the second PC 3 via the second communication data transmission line 18, keyboard input

signals sent from the keyboard 141 via the keyboard input signal transmission line 151, and mouse input signals sent from the mouse 142 via the mouse input signal transmission line 152 are sent to the communication data identifying unit 169.

Now, the actions of the window information generating unit 53 and the liquid data conversion control signal generating unit 127 are similar to those of the communication controller in Fig. 4. Also, the communication controller 153 operates in the same way as the communication controller 21 in Fig. 4 except in the following respects.

For some specific key manipulations of the keyboard 141, input device output PC switching, display contrast alteration for the monitor device 138, display brightness alteration for the monitor device 138, and display position adjustment alteration for the monitor device 138 are allocated in advance.

Then, the communication data identifying unit 169 is so disposed as to monitor all the time keyboard input signals sent from the keyboard 141 via the keyboard input signal transmission line 151. Keyboard input signals representing other key manipulations than the aforementioned specific ones are either sent to the first PC 2 via the first communication data transmission line 15 as communication data or to the second PC 3 via the second communication data

transmission line 18 as communication data. The PC to transmit the keyboard input signals is switched when a key manipulation to switch the input device output PC is detected. Further, the communication data identifying unit 169 transmits mouse input signals sent from the mouse 142 via the mouse input signal transmission line 152 to the PC transmitting the keyboard input signal via the first communication data transmission line 15 or the second communication data transmission line 18 as communication data.

The keyboard 141 and the mouse 142 connected to the monitor device 138 are thereby enabled to be used as input devices for the first PC 2 and the second PC 3.

Further, the communication data identifying unit 169, when it has detected a specific key manipulation for display contrast alteration for the monitor device 138, display brightness alteration for the monitor device 138, or display position adjustment alteration for the monitor device 138, hands over the content of the alteration represented by that key manipulation to the liquid data conversion control signal generating unit 127.

It is thereby made possible to alter from the keyboard 141 connected to the monitor device 138 device 138.

Incidentally, it may as well be so disposed as to permit position and size alteration of the display image 7

on the second PC 3 similar to alteration of the contrast, brightness and/or position adjustment of the display on the monitor device 138. Also, as the mouse 142 is connected to the monitor device 138, it may be so arranged as to have the monitor device 138 manage the position and size of the display image 7 on the second PC 3 and to accept their alteration according to the user's manipulation of the mouse 142. In this case, the monitor device 138 accepts alteration of the position and size of the display image 7 on the second PC 3 in accordance with the dragging of the mouse 3. Thus, when it has detected dragging of the title bar position of the display image 7 on the second PC 3, it alters the position of the display image 7 on the second PC 3 instead of sending the content of the manipulation to the first PC 2 or the second PC 3, or when it has detected dragging of the right bottom corner of the display image 7, it alters the size of the display image 7 on the second PC 3 instead of sending the content of the manipulation to the first PC 2 or the second PC 3.

Fig. 13 illustrates still another mode of use of the monitor device.

As illustrated, the keyboard 141 and a camera 188 are connected to a monitor device 184, and the mouse 5 is connected to the first PC 2.

Next, the connective relationships of the monitor device 184 to the first PC 2, the second PC 3, the keyboard 141 and the mouse 142 are shown in Fig. 14.

As illustrated, the connections of the monitor device 184 to the first PC 2 and the second PC 3 are similar to the corresponding connections shown in Fig. 9. In the mode of use illustrated in Fig. 13, the monitor device 184 is connected to the keyboard 141 and to the camera 188 respectively by the keyboard input signal transmission line 151 and a camera input signal transmission line 210. Both the keyboard input signal transmission line 151 and the camera input signal transmission line 210, like the first communication data transmission line 15 and the second communication transmission line 18, consist of a USB.

As shown in Fig. 15, an image represented by camera input signals from the camera 188 connected to the monitor device 184 can be displayed within the display image 6 of the first PC 2 displayed on the monitor device 184 as the display image 191 of the camera.

Fig. 16 illustrates the configuration of the monitor device 184 which makes possible such actions.

As shown in Fig. 16, the configuration of the monitor device 184 features the connection of the keyboard input signal transmission line 151 and the camera input signal transmission line 210 to the communication controller 153.

As a result, the monitor device 184 are characteristic in the configurations and actions of the communication controller 211 and the display controller 218.

First will be described details of this communication controller 211.

Fig. 17 illustrates the configuration of the communication controller 211.

As illustrated, the communication controller 211, like what is shown in Fig. 5, comprises a communication data identifying unit 300, the window information generating unit 53 and the liquid data conversion control signal generating unit 127.

Here, communication data sent from the first PC 2 via the first communication data transmission line 15, communication data sent from the second PC 3 via the second communication data transmission line 18, keyboard input signals sent from the keyboard 141 via the keyboard input signal transmission line 151, and camera input signals sent from the camera 188 via the camera input signal transmission line 210 are entered into the communication data identifying unit 300.

Now, the actions of the window information generating unit 53 and of the liquid data conversion control signal generating unit 127 are similar to those described above with reference to Fig. 5. Also, the actions of the

communication controller 211 are the same as those of the communication controller 21 shown in Fig. 5 except in the following respects.

Thus, the communication data identifying unit 300 processes keyboard input signals sent from the keyboard 141 via the keyboard input signal transmission line 151 in the same manner as described with reference to Fig. 12. This enables the keyboard 141 connected to the monitor device 184 to be used as the input device for the first PC 2 and the second PC 3.

Also the communication data identifying unit 300 sends camera input signals sent from the camera 188 via the camera input signal transmission line 210 to the display controller 218 as camera display data 217.

Next will be described details of the display controller 218.

Fig. 18 illustrates the configuration of the display controller 218.

As illustrated, the configuration of the display controller 218 is such that a camera data converter 225 and a camera data selector 235 are added to the display controller 24 of Fig. 6.

The camera data converter 225 converts the camera display data 217, which are serial data, into camera display parallel data 229, which are parallel data like the

superposed display data 35. Along with this conversion, it generates a camera display position instructing signal 230 for instructing what part of the liquid crystal display 222 a camera image displayed position 199 should be displayed in.

The reference display position for the camera image displayed position 199 here being supposed to be a position set in the camera data converter 225 in advance, and the size of the camera image displayed position 199 matching the resolution of the camera display data 217, the camera data converter 225 generates the camera display position instructing signal 230. For instance, Fig. 15 illustrates a case in which the resolution of the camera display data 217 is 320 × 240 dots, and in this instance the sizes of the camera image display position 191 in the horizontal and vertical directions are respectively 320 dots and 240 dots.

Further, the camera data converter 225 supplies as this camera display position instructing signal 230 a single bit signal which is "0" when the scanning position of the monitor device 184 is in a position not to display the camera image displayed position 191 or "1" when it is in a position to display the camera image displayed position 191. To add, the camera display parallel data 229 here are supposed to be display data of eight bits each of RGB (16.7 million color display).

Next, the camera data selector 235, in accordance with the camera display position instructing signal 230, switches the superposed display data 35 and the camera display parallel data 229 so as to supply the camera display parallel data 229 in the display timing of the camera image displayed position 191, and supplies the data to the liquid data converter 36 as camera superposed display data 236. Here it supplies the superposed display data 35 when the camera display position instructing signal 230 is "0" and the camera display parallel data 229 when the signal is "1".

The liquid data converter 36 converts the camera superposed display data 236, which are parallel data of RGB of eight bits each, into input signals for the liquid crystal display 26, and supplies the converted data as the liquid crystal display data 25.

This makes it possible to display an image represented by camera input signals from the camera 188 connected to the monitor device 184 within the display image 6 of the first PC 2 displayed on the monitor device 184 as the camera display image 191.

Also, the monitor device 184 may send, according to a specific manipulation of the keyboard 141 connected to the monitor device 184, the camera input signals from the camera 188 to the first PC 2 or the second PC 3 as communication data.

Further, the position and size of the camera display image position 199 may be disposed to be alterable by the same technique as that for the display image 3 of the second PC 3 described above.

Modes of implementing the present invention has been described so far.

As hitherto described, the invention can provide a monitor device capable of displaying output display images of a plurality of computers at the same time. The invention also enables the user to use, without having to leave a specific input device, that specific input device and a specific monitor device as the monitor device and input device of a plurality of computers.